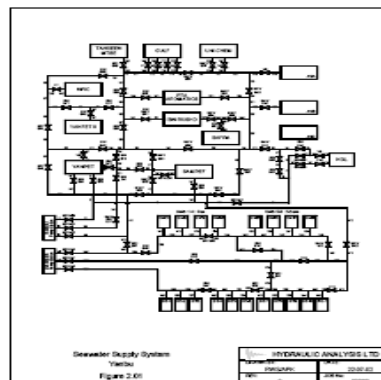




Yanbu Al-Sinaiyah Seawater Distribution System Site Investigation and Optimisation Study

System	: Seawater Cooling
Location	: Saudi Arabia
Scope	: Optimisation / Design Study
Client	: Saudi Bin Laden Group
Study Date	: 2002
Pipe Sizes	: 600 mm to 3700mm
Fluid	: Seawater
Capacity	: 630,000 m ³ /hr



Study Scope

The Seawater Cooling System in the Industrial Port City of Yanbu, Saudi Arabia, has a capacity of 640,000 m³/hr (15.3 million m³/day) to supply seawater to various users through 27 km of under ground FRP pipework. The under ground pipework ranges in diameter from 600 mm to 3700 mm and is classified in primary, secondary and tertiary loops for stability, uniform pressurising and redundancy in the supply network. The seawater is used for both cooling at the various city refineries / plants and also for desalination for the entire city.

Hydraulic Analysis Limited were commissioned to carry out pressure and flowrate measurements on site to establish the capacity of the network in terms of pipeline roughness and also pump performance and capacity. The pumping station houses a total of 15 seawater supply pumps (6 x 25,000 m³/hr units, 6 x 50,000 m³/hr units and 3 x 60,000 m³/hr units). We attended the site and installed our transient pressure and flow monitoring equipment on the system. In order to determine the pump capacity, specialised velocity profilers were installed in the pump inlet channels to measure the pump flowrates across a range of operating conditions.

Once the system capacity had been established through 5 days of pressure and flowrate logging, a hydraulic design study was undertaken to determine the potential future capacity of the system if additional pumps were installed to supply the planned network expansion. Over 400 different steady state scenarios were modelled to assess the optimum design to minimise system velocities (and hence headlosses) whilst limiting the requirement to install new supply pipelines. In addition to the steady state cases, a number of transient upset events were modelled to ensure the future design was secure and to optimise the system vacuum breaker design to prevent unacceptable sub-atmospheric pressures from occurring due to pump and/or isolation valve operations.



Hydraulic Analysis Ltd
Mill House
Hawksworth Road
Horsforth
Leeds
LS18 4JP

Tel:
+44 (0)113 258 1622

Website:
hydraulic-analysis.com

Email:
info@haltd.co.uk

